

**Remarks:**

The specification and claims 19-22, and 30 have been amended for clarity. No new matter has been added.

Claims 16-22, 24-27 and 30-45 were rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. More particularly, the Office Action stated that the difference between hard particles and braze particles was unclear, and it was also unclear when the hard particles may or may not be equivalent to the braze particles.

The hard particles are the particles that are bonded to the substrate to form the wear-resistant, hard particle layer. The hard particles are described extensively at page 7, line 10 to page 8, line 25.

The braze alloy or braze particles braze the hard particles to the substrate as described in the specification first with regards to the prior art at page 2, lines 8-11, and then more specifically at page 4, lines 2-8, page 5, lines 24-26, page 6, lines 10-11, and pages 16-17.

In some embodiments, the braze alloy or braze particles contain precipitates, such as tungsten carbide, molybdenum carbide, niobium carbide and chromium boride, which are the hard particles that are bonded to the substrate to form the wear-resistant, hard particle layer as described at pages 9-10. Separate admixed hard particles may also be used with the hardfacing alloys as will be described in detail later.

Referring to the specification, it has been amended on pages 6-7 to more clearly match the more detailed description found later in the specification on pages 9-10 and also at page 21. As pointed out on page 10, lines 4-6, "the term hardfacing includes composite coatings of hard particles metallurgically bonded to a metal substrate using a braze alloy, whether the hard particles are admixed separately or whether they *are precipitates within the braze alloy itself.*" In addition, at page 21, lines 2-4, "the alloy coating without admixed hard particles includes a dispersion of precipitated hard intermetallic compounds, *which*

*themselves are hard particles.*" The specification makes it clear that in some embodiments the precipitates within the braze alloy are the hard particles. Of course, as described in the specification in other embodiments, the hard particles are admixed separately, and in still other embodiments, the hard particles are admixed separately as well as being precipitates within the braze alloy.

Referring now to the claims:

Claims 16-18 describe a first embodiment in which a hard particle layer is first painted over the area of metal needing protection followed by a second layer of paint, which contains the necessary braze particles. The metal is heated to a temperature above the liquidus of the braze alloy and then cooled.

Claims 19-22 describe another embodiment in which the hard particles and braze particles are incorporated into a single layer of paint. The single layer of paint process is described in the specification from page 21, line 18 to page 22, line 20. Independent claim 19 recites the process, and variations are reflected in dependent claims 20-22. The variations pertain to the source of the hard particles.

In claim 20, the hard particles are hard precipitates dispersed in a braze alloy as described in the specification on page 9, line 1 to page 10, line 12. Thus, the hard particles are in the "hardfacing alloys" and do not have to be separately added or mixed. Examples of such hardfacing alloys are provided in Examples 8 and 11 which include Colmonoy 6 and Colmonoy 88, respectively. Both Colmonoy 6 and Colmonoy 88 are hardfacing alloys containing hard precipitates manufactured by the Wall Colmonoy Company and known in the art.

In claim 21, the hard particles are separate particles admixed with the braze particles as described on page 9, lines 21-22. An example of this situation is described on page 21, lines 23-25. Page 21 describes a paint to be applied in a single layer, wherein the paint includes tungsten carbide powder (the hard particles) and eutectic Ni/Cr/B braze (the braze particles).

In claim 22, the hard particles include hard precipitates within the braze particles along with additional separate particles admixed with the braze

particles. As stated in the specification at page 9, lines 18-21: "In general, the *hardfacing alloys which contain substantial hard precipitates are preferred for use both to braze admixed hardfacing particles onto the substrate* and to form hardfacing surfaces on their own, without the admixture of additional hard particles." Thus, separate hard particles (like tungsten carbide) may be admixed with a hardfacing alloy which would mean that there are two sources for the hard particles.

Claim 23 was canceled.

Claims 24-27 recite a process including steps where an adhesive layer is applied to the substrate, then hard particles are applied to the adhesive layer, then another adhesive layer is applied, and then braze particles (in powder form) are applied to the second adhesive layer.

Claims 28-29 were cancelled.

Claims 30-31 involve the application of a layer of paint comprising "over 15 percent of fusible metallic hardfacing particles." Similar to claims 19-22, the application of the hard particles and braze particles occur in a single layer of paint (in this case, through submersion). Again, like claims 19-22, the source of the hard particles may vary. The hard particles may be hard precipitates dispersed in a braze alloy as described in the specification from page 9, line 1 to page 10, line 12 and in Examples 8 and 11, or they may be separate hard particles admixed with the braze alloy as described at page 9, lines 21-22, and further exemplified on page 21, lines 23-25. Claim 30 has been amended for clarity. No new matter has been entered.

Claims 32-34 describe another embodiment in which the hard particles and braze particles are applied in separate steps.

Claims 35-38 depend from claim 16 (where the hard particles and braze particles are applied in separate layers).

Claim 39 is an independent claim reciting a single layer paint process, wherein the ratio of hard particles to braze particles is specified. Support for this claim can be found at page 22, lines 18-19.

Claims 40-41 depend from claim 24 (where the hard particles and braze particles are applied in separate layers).

Claims 42-43 recite a single layer coating process for applying paint to a hollow cylinder. Claim 43 has been amended to make it clear that the *hard* particles are selected from the group consisting of "carbides, nitrides, silicides, and borides" and the *braze* particles are selected from the group consisting of "nickel-based, cobalt-based, and iron-based hardfacing alloys".

Claims 44-45 describe the two layer coating process for a hollow cylinder.

In view of the above, Applicant submits that the claims comply with the requirements set forth in 35 U.S.C. 112, second paragraph, and requests allowance of the pending claims. If the Examiner has any other problems with the application, Applicant would appreciate a phone call to help expedite their resolution.

Respectfully submitted,



/Theresa Fritz Camoriano/

Theresa Fritz Camoriano  
Reg. No. 30,038  
Camoriano & Associates  
8225 Shelbyville Road  
Louisville, KY 40222  
phone (502) 423-9850  
fax (502) 426-1167